Claims

1. A method for adjusting the optical properties of an anti-reflective coating (ARC) layer comprising the steps of:

providing a preprocessed semiconductor substrate having a SiN_x or a polysilicon layer on a top surface;

depositing a dielectric ARC layer on said SiN_x or said polysilicon layer; and

annealing said dielectric ARC layer deposited on said semiconductor substrate at a temperature of at least 400°C and in a gas comprising at least one element selected from the group consisting of N_2 and O_2.

2. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of depositing SiON or SiONH on said SiN_x or said polysilicon layer.

3. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of depositing SiON on said SiN_x or said polysilicon layer by a plasma enhanced chemical vapor deposition (PECVD) technique.

4. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of depositing SiON on said SiN_x or said polysilicon layer by a plasma enhanced chemical vapor deposition (PECVD) technique to a thickness of at least 500 Å.

5. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1, wherein said gas used in said annealing process is O_2.

6. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1, wherein said gas used in said annealing process is N_2.

7. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1, wherein said gas used in said annealing process is a mixture of O_2 and N_2.

8. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1, wherein said dielectric anti-reflective coating layer is deposited of a material selected from the group consisting of SiO_2, SiON and SiONH.

9. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of annealing said dielectric anti-reflective coating layer at a temperature between about 400°C and about 1,000°C.

10. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of annealing said dielectric anti-reflective coating layer for a time period between about 1 min. and about 30 min.

11. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of annealing said dielectric anti-reflective coating layer for a time period between about 1 min. and about 30 min.

12. A method for adjusting the optical properties of an anti-reflective coating layer according to claim 1 further comprising the step of adjusting said optical properties of the dielectric anti-reflective coating layer to a reflective index (n) between about 2.0 and about 2.5, and an extinction coefficient (k) between about 0.2 and about 0.8.

13. A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer by the steps of:

providing a SiN_x or polysilicon layer covered semiconductor substrate;

depositing a dielectric anti-reflective coating layer of a material selected from the group consisting of SiO_2, SiON and SiONH on top of said SiN_x or said polysilicon layer; and

heating said semiconductor substrate to a temperature between about 400°C and about 1,000°C in an environment that comprises at least one of N_2 or O_2.

14. A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate for a length of time sufficient to vary the extinction coefficient of said dielectric anti-reflective coting layer by at least 10%.

15. A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate for a length of time between about 1 min. and about 30 min.

16. A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate for a length of time between about 3 min. and about 5 min.

17. A method for adjusting the extinction coefficient (k) of a dielectric anti-reflective coating layer according to claim 13 further comprising the step of heating said semiconductor substrate to a temperature of at least 600°C in an environment of O_2.